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GSI Water Solutions, Inc.

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Office of Environmental Cleanup

To: Noel Mak/ATI Metals

From: Peter Pellegrin/GSI Water Solutions, Inc.
Randy Pratt/GSI Water Solutions, Inc.

Date: **May 5, 2017**

Re: **Acid Sump Area, Source Area Soil Excavation Construction Report**

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1. Introduction

This memorandum presents a summary of additional remedial action completed in the Acid Sump Area of the ATI Millersburg (ATI), Albany, Oregon, facility (Site) (see Figure 1). The U.S. Environmental Protection Agency (EPA) approved the *Acid Sump Area Source Area Remedial Action Plan – Final* (Work Plan; GSI, 2016) on June 30, 2016. Preliminary work began soon after with the installation of sumps, construction of the soil treatment pile, and plumbing of the groundwater treatment plant (GWTP). Excavation of soil took place from August 1 through 9, 2016, and final analytical testing of the soil in the soil treatment pile concluded the project on August 31, 2016.

2. Background

In September 2007, ATI intercepted a source of 1,1,1-trichloroethane (TCA) while attempting to install an additional extraction well, FW-8, in the Acid Sump Area. Previous investigations and bioremediation efforts as a result of this interception were discussed in the *Revised Acid Sump Source Removal and Treatment Remedial Design Work Plan* (GSI, 2015). Groundwater sampling data since 2007 suggested that a persistent source of dense nonaqueous-phase liquid (DNAPL) existed in the subsurface adjacent to the location of the attempted installation of FW-8. In August 2016, ATI excavated the soil directly below the asphalt patch marking the location of FW-8 and all of the soil between surrounding structural barriers, such as acid tanks, sumps, and subsurface utility corridors. The excavation was completed to bedrock within these barriers and removed approximately 500 cubic yards of soil contaminated with chlorinated volatile organic compounds (CVOCs).

3. Remedial Action Summary

The focus of the remedial action was to remove a TCA source area in the Acid Sump Area that was approximately 31 feet wide by 25 feet long by 16 feet deep. Before excavation work could begin, several preliminary steps had to be completed:

- Utility location and mapping.

- Facility meetings to assess lines of responsibility, necessary health and safety measures, and coordination with ongoing facility operations.
- Construction of a soil treatment pad that could immediately store and treat excavation soils and debris when digging began.
- Construction and plumbing of a GWTP that could begin dewatering operations through newly installed sumps both before and during the soil excavation project.
- Design and construction of structural supports to brace acid conveyance corridors adjacent to the planned excavation.

After preliminary tasks were completed, Bob Barker Trucking (Barker) began the excavation of soils in the Acid Sump Area. The excavation area was divided into seven segments, each of which was completed before moving to the next segment. Details of the excavation engineering, chemical oxidant treatment, backfilling, and soil analytical testing are discussed in Section 4.

Approximately 500 cubic yards of soil were removed during the project and transported to the soil treatment pile located in the Schmidt Lake Excavation Project (SLEP) soil treatment area. Treatment areas were constructed to treat excavation soils, wet or liquid soils, and excavation debris. Soils were mixed and treated with chemical oxidant and tested to verify compliance with disposal requirements of the federal Resource Conservation and Recovery Act (RCRA). Details of the soil treatment processing are presented in Section 5.

A GWTP was constructed to begin dewatering operations before the excavation of any source area soils. Dewatering sumps were installed and plumbed to a filter tank, air stripper, and treated water tank. During excavation operations additional portable sump pumps were used to control and treat the infiltration of water. Approximately 6,900 gallons of groundwater were extracted and treated to concentrations below EPA's maximum contaminant levels (MCLs) during the project. Details of the groundwater treatment and verification sampling are presented in Section 6.

4. Source Area Excavation

Preliminary excavation work began immediately after EPA approval of the Work Plan. Structural supports were designed and constructed, and backfill materials were obtained and stockpiled onsite. Chemicals, analytical supplies, and ventilation equipment were purchased and organized into a small work camp just to the west of the excavation alongside the filter tank (see Figure 2). Soil excavation began on August 1, 2016, and continued through August 9, 2016, with no significant interruptions or delays.

4.1 Preliminary Work

Preliminary Site work included the design and construction of bracing to support the overhead and subsurface acid conveyance corridors at the Site. John Evans, SE, of Pillar Engineering, designed a single integrated support structure that braced the overhead acid line with a large beam and the subsurface conveyance corridor with an above-grade beam (see drawings in Attachment A). Triple C Construction, Inc. (Triple C), a contractor qualified and experienced in the construction of concrete footings, built the footings for the temporary support structures. Bender Mechanical Services, Inc. (Bender), fabricated and installed the steel columns and beams on the new footings. Completed support structures then were inspected by John Evans for conformity with the engineering design.

Public and private utility locates were completed to identify active utility lines and corridors within the excavation area. A primary concern was the stormwater line used by the Flakeboard facility that was believed to bisect the planned excavation. ATI personnel advanced a transponder through the stormwater line and determined that it did not pass through the excavation area. The accuracy of this determination was confirmed during the project and the stormwater line was never encountered.

Groundwater extraction sumps for dewatering the excavation were installed during the week of July 20, 2016. Temporary monitoring well TMW-1 was converted to sump S1 (see Figure 2) and monitoring well I-2 was converted to sump S2. These two wells were within the footprint of the excavation and thus intended for abandonment. The advantage of over-drilling them and converting them to sumps was the decreased likelihood that the drilling would encounter obstacles during the installation. The sumps were installed by Steadfast Services, an Oregon licensed driller, and completed approximately 6 inches into the underlying Spencer Formation. The 8-inch-diameter slotted polyvinyl chloride (PVC) sumps were installed with a 12-inch hollow stem auger and surrounded with pea gravel as a filter pack. The sumps were fit with submersible pumps and plumbed to a GWTP. Sump operations and details are presented Section 6.

4.2 Excavation Overview

The excavation team consisted of approximately 13 to 16 personnel:

- Soil excavation crew from Barker (5): one Takeuchi TB 175 excavator operator, two support crew, one driver for a 10-cubic-yard dump truck, and one operator for a Case CX160C excavator for mixing soils in the soil treatment pile
- Geotechnical engineering oversight (1): David Running, PE, GE, of Foundation Engineering Inc., for evaluation of geotechnical conditions and risk assessment during the project
- Project implementation personnel from GSI (4): one engineer monitoring the progress of the excavation, air monitoring, and soil analytical testing; two staff members focused on groundwater control and treatment, air monitoring, and chemical oxidation in the excavation; and one staff member managing construction and treatment of excavated soils
- EPA oversight from EA Engineering, Science, and Technology, Inc. (1)
- DEQ oversight (1)
- Project management and support from ATI (2 to 5): environmental oversight, facilitation of communications, permits regulator, air monitoring support and evaluation, coordination with onsite ATI staff and facility operations

The excavation proceeded according to the Work Plan with several refinements:

- The components of the GWTP were clustered closer together to protect and minimize the plumbing connections (see Figure 2 versus Figure 4-1 of the Work Plan).
- Well I-1 was used instead of TMW-4 for the installation of sump S2 because it is located closer to the perimeter of the excavation and would interfere less with the operation of the excavator.

- The excavation was somewhat larger than planned in the southeast corner because onsite geotechnical assessment of the wall integrity in that area allowed the digging to take place closer to the subsurface utility corridor than anticipated.
- The project proceeded through seven segments rather than five because smaller segments were safer to complete as they exposed shorter sections of unsupported walls to potential collapse or unraveling (see Figure 3 - Plan View).
- Controlled low strength material (lean concrete or CLSM) was used to backfill the full depth of the excavation above the underlying drain rock in the perimeter segments to provide greater structural stability and safety while excavating the larger interior segments of the excavation (Segments 6 and 7).

The daily construction sequence generally consisted of removing the soil in a segment down to bedrock at approximately 15 feet below ground surface (bgs). The excavator continuously loaded a dump truck to minimize stockpiling materials at ground surface. Debris, such as abandoned pipes, wells, steel or concrete, was sorted and stockpiled for delivery to the debris-area in the soil treatment area. The dump truck delivered soil to the soil treatment pile by backing onto the soil treatment pile and dumping while driving out to prevent compacting the soils by driving over them. A second excavator, positioned in the soil treatment pile, immediately began mixing and leveling the soils for treatment.

When the excavation reached bedrock, portable submersible pumps were deployed to control groundwater. The excavator grabbed soil samples in the perimeter segments from the excavation walls and floor for CVOC analysis and then began filling the hole-segments with drain rock. Chemical oxidant mixed with water was placed on top of the drain rock by the bucket of the excavator and covered with filter rock. Equipment was removed from the excavation and the area was prepared for the delivery and backfilling with pre-mixed CLSM.

At the end of the day, the work area and equipment were cleaned and the exclusion zone was reestablished around all four sides of the excavation. The CLSM backfill cured overnight and the following day the excavation resumed in the next segment

After the perimeter segments were completed, the central segments (6 and 7) were excavated to depth at the same time, then backfilled. Drain rock, chemical oxidant, and filter rock were placed in the bottom of the hole similar to the perimeter sections, then ¾-inch minus rock was applied in approximately 12-inch lifts and hoe-compacted to ground surface. Table 1 presents an overview of activities by day and excavation segments are shown in Figure 3.

Table 1. Excavation Project Overview
ATI Millersburg Operations, Oregon

Date	Work Area	Depth to Bedrock (feet)	Excavation Volume (cubic yards)	Chemical Oxidant Applied (pounds)	Fill Volume[1] (cubic yards)	Construction Notes
Aug 1	Segment 1	14	50	--	--	Cut and pulled asphalt. Temporarily backfilled Segment with 2-inch minus rounded gravel, and 3/4-inch minus filter rock[2]. CLSM ordered for August 2, 2016.
Aug 2	Segment 2	14	15	180	55	Fill with drain rock[3], then CLSM into Segments 1 and 2.
Aug 3	Segment 3	15.5	60	360	60	Fill drain rock, persulfate, and 6-inch-deep layer of filter rock, then CLSM into Segment 3.
Aug 4	Segment 4	15	65	180	70	Fill drain rock, persulfate, and 6-inch-deep layer of filter rock, then CLSM into Segment 4.
Aug 5	Segment 5	14	15	225	40	Fill drain rock, persulfate, 6-inch-deep layer of filter rock, then CLSM into Segment 5. CLSM applied to all sections to raise the fill to just below ground surface.
Aug 8	Segment 6	14.5	230	--	--	No backfill, left open overnight.
Aug 8	Segment 7	15	30	900	260	Backfill Segments 6 and 7 using round 2-inch minus round rock to 9 feet bgs. Persulfate applied at 13 feet bgs. Filter rock hoe-packed in 1-foot lifts from 9 feet bgs to the surface.

Notes.
[1] Excludes material added then removed (e.g., controlled low strength material [CLSM], round gravel), accounting for native material removed.
[2] Filter rock is ¾-inch minus angular rock.
[3] Drain rock is 2 -inch minus angular rock.

4.3 Excavation Findings

The excavation began in the northeast corner in Segment 1. This was done primarily to take advantage of the inherent strength of the undisturbed soils in a sensitive portion of the excavation and to remove what were expected to be highly contaminated soils first to reduce the potential for cross-contaminating clean fill materials.

In 2007, when the driller intercepted the TCA source while attempting to install extraction well FW-8, the steel drill rod was abandoned in the borehole. During the excavation in Segment 1 the excavator followed the steel drill rod down to the bottom of the hole while disturbing it as little as possible. Various abandoned piping, concrete blocks, and debris were encountered through the course of the excavation. Two 5-foot-diameter by 2-foot-high circular steel scraps were found at the bottom of the hole that may have been pickling baskets. There were no other metal scraps, metallic debris, or segments suggesting that an underground tank had ever been present at the Site. One of the metallic scraps was found atop the Spencer Formation at the bottom of the hole and at the end of the abandoned drill rod. It is conjectured that debris may have acted to retain source material at some point, similar to a cup. A conceptual drawing of the metal debris and its location in the excavation are presented in Figure 3. A photograph of the metallic object brought to the surface is presented in Attachment B.

4.4 Backfill, Chemical Oxidation, and Compaction

Backfilling and compaction of the excavation was completed in accordance with the Work Plan with some minor modifications. The perimeter segments were excavated first and served as a barrier wall for the interior segments or central portions, so there was a difference in how they were backfilled.

All segments were excavated to the impervious Spencer Formation, which varied in depth from 14 feet bgs in the northeast corner (Segment 1) to 16 feet bgs in the southwest corner (Segment 4). After as much water as practical had been removed from the excavation and the soil analytical samples were collected, the process of backfilling the hole began.

Perimeter Segments 1,2,3,4, and 5

The perimeter segments were backfilled in the following sequence:

- 15 to 13 feet: 2-inch-minus-diameter drain rock
- 13 feet: Application of alkaline-activated persulfate (Klozur™ by PeroxyChem) after mixing with water and distributed mechanically by the excavator bucket at an application rate of approximately 2.5 pounds per square foot
- 13 to 12.5 feet: Layer of ¾-inch-minus filter rock placed atop the oxidant
- 12.5 to 2 feet: Successive cement mixer loads of 500 pounds per square inch (psi) CLSM

Interior Segments 6 and 7

The central portions of the excavation were backfilled without using CLSM in the following sequence:

- 15 to 13 feet: 2-inch-minus-diameter round drain rock
- 13 feet: Application of alkaline-activated persulfate (Klozur™ by PeroxyChem) after mixing with water and distributed mechanically by the excavator bucket at an application rate of approximately 2.5 pounds per square foot
- 13 to 9 feet: 2-inch-minus-diameter round drain rock
- 9 to ground surface: ¾-inch-minus-diameter filter rock hoe-packed in 1-foot lifts to the surface

Completion

During the week following backfilling (August 15, 2016), Bender returned to the Site to dismantle the temporary steel support structures. Triple C then removed the concrete footings it had installed for the utility bracing. After this work was completed, final grading and asphalting were completed by Barker. At that point, the concrete berms defining the work exclusion zone were removed and the area was returned to pre-excavation condition.

4.5 Analytical Sampling of the Excavation

To characterize soils that were left in place discrete samples were collected from the four walls and floor of the excavation in accordance with the Work Plan. Four discrete samples were collected from each sidewall and four samples from the floor for a total of 20 analytical samples.

The confined area of the excavation necessitated opening up 14- to 16-foot-deep vertical walls and there was no ability to safely enter the excavation. Before soil samples were collected, a GSI engineer prepared bottles and equipment to minimize collection time and potential loss of volatiles from the soil. The excavator bucket was used to remove blocks of soil for analytical testing. The blocks were broken open and a sample immediately was collected with a Terra Core™ sampler. Samples were field-preserved according to EPA Method 5035, immediately placed in an iced cooler, and transported under chain-of-custody protocol directly to the CH2M HILL Applied Sciences Laboratory (ASL) in Corvallis, Oregon, for analysis.

Some sampling bias anticipated in the Work Plan was observed in the field. Wall samples more than 6 feet bgs were generally in the Linn Gravels and were difficult to capture in the Terra Core™ chamber. Groundwater seeping through the excavation walls varied from location to location producing variation in the moisture content of the samples. Floor samples were essentially from pulverized, ground-up siltstone that often was covered in 1 to 3 inches of residual groundwater that could not be pumped from the bottom of the excavation. These samples are likely to have been affected by the presence of contaminated groundwater.

Excavation soil samples were labelled with a coordinate system that describes the xy location of the sample relative to a benchmark and the depth of the sample. An explanation of the coordinate system and the location of the soil samples in the excavation are presented in Figure 4. Analytical results are presented in Table 2. The highest concentration for TCA (294,000 micrograms per kilogram [µg/kg]) was collected in the northeast corner near attempted well FW-8. The next highest concentration for TCA (155,000 µg/kg) also was collected along the base of the north wall. For comparative purposes, there were no CVOC concentrations that exceeded Oregon Department of Environmental Quality (DEQ) risk-based concentrations for exposure to an excavation worker (DEQ, 2015).

4.6 Health and Safety Monitoring

Air monitoring was completed in accordance with the Site-Specific Health and Safety Plan (HSP) dated July 25, 2016. ATI personnel coordinated preliminary health and safety meetings to discuss safety procedures and chemicals used by ATI's staff in the Acid Sump Area. ATI personnel visited the project area before work began to meet the project team and to identify and evaluate potential issues with the planned work. Acid training was completed by all GSI field personnel and equipment was brought onsite to respond to any chemical exposures. A wind sock was positioned to assist with identifying wind velocity and direction, and ventilation equipment was set up to both remove potential fumes from the hole and to protect those working at ground surface adjacent to the digging.

Air monitoring was completed using photoionization detectors (PIDs) and Draeger tubes. Up to four PID units were used continuously throughout the project:

- One was placed in the cab of the excavator with a high-level alarm that could be heard over the noise of the machine.
- One was used by the Barker excavator spotters and support crew to monitor conditions in the immediate work area.
- One was used by GSI to as a backup to the excavator spotter and to monitor air anywhere within the work exclusion zone.
- One was used by ATI personnel to perform perimeter monitoring, confirm readings from the other instruments, and assess air quality at air intakes and within nearby facility buildings.

The HSP required a work stoppage and measurement of vinyl chloride (VC) concentrations with Draeger tubes any time there were sustained PID measurements of 5 parts per million (ppm) or greater for 5 minutes or longer. In practice, a more conservative monitoring metric was adopted to be more protective of worker safety. In Segment 1, for example, there were several PID detections between 5 and 10 ppm that lasted for less than 1 minute. Work was stopped during these instances and the intake of a 10-inch-diameter inline blower was positioned near the bottom of the hole with a discharge point located approximately 15 feet above the ground and away from the breathing zone. Level C personal protective equipment (PPE) was donned on several occasions when PID detections were above 5 ppm, but were sustained for less than 5 minutes. Level C PPE also was donned by the engineer while collecting soil samples from the excavation. The 50 ppm PID action level for evacuation from the work area was never encountered during the project.

Draeger tubes were used to detect concentrations of VC when PID detections of 5 ppm or greater were encountered. At no time did the Draeger tube measurements exceed the action level of 0.5 ppm.

In addition to real-time air monitoring, passive monitoring badges were worn by the excavator operator, excavator spotter, and engineers monitoring the excavation and soil treatment operations. The Assay Organic Vapor Badges, N566, were supplied and analyzed by SGS Galson Laboratories of East Rochester, New York. The GC/FID badges were analyzed for the presence of TCA and VC by analytical method NIOSH 1007. VC was not detected in any of the badges worn by construction workers at greater than 0.06 ppm, which is well below the Occupational Health and Safety (OSHA) time-weighted average (TWA) value of 1.0 ppm. The highest value recorded for TCA, 1.8 ppm, was recorded from the badge of an excavator spotter on August 3, 2016. The OSHA TWA for TCA is 350 ppm. Analytical results of the passive badge monitoring are presented in Table 3.

At the recommendation of ATI personnel, a hazard assessment was completed on all abandoned and/or unidentified utilities encountered during the investigation. Pipes and conveyances were assumed to have had acid in them until proven otherwise. With the exception of a shallow stormwater conveyance line in the northwest corner of the excavation, no active utility corridors were intercepted during the digging. Any pipes or lines encountered were tested with litmus paper or a YSI multi-parameter meter. On no occasion was the pH found to be less than 5 or greater than 7. All conveyance piping intersecting the excavation was cut and removed, and taken to the debris area in the soil treatment area.

5. Soil Treatment

In the week before soil excavation began, a soil treatment pad was constructed atop the SLEP soil treatment area located approximately ¼ mile west of the Acid Sump Area source area. During the first 8 days of August 2016, approximately 500 cubic yards of soil were brought to the soil treatment pad. A dump truck brought soils from the excavation that then were spread to a thickness of 18 to 24 inches using a backhoe. The backhoe mixed the soils after spreading and broke up soil chunks to allow for volatilization and chemical treatment with approximately 2,000 pounds of chemical oxidant. Soils continued to be mixed and monitored for moisture and odor (using a PID) before collecting soil analytical samples on August 31, 2016. Additional details concerning the management, processing, treatment, and testing of excavated soils and debris are provided in the following sections.

5.1 Soil Treatment Pile Construction

The soil treatment pad occupied approximately 12,000 square feet in the southeast section of the SLEP. A prefabricated 144-foot x 160-foot x 8-mil low-density polyethylene (LDPE) scrim liner provided by Northwest Linings and Geotextile Products of Kent, Washington, was unfolded and spread over the SLEP asphalt base by a five-person crew. The edges of the liner were secured by draping them over jersey barriers, which provided hydraulic control from potential runoff or erosion.

Excavated soils were brought from the excavation area to the soil treatment pile in a 10-cubic-yard dump truck. The dump truck would back into the soil treatment pile and dump while driving forward to prevent compacting soils under the truck's tires. A GSI engineer used a PID and visual observations to determine where soils should be placed in the soil treatment pile:

- Excavated soils with less than 70 ppm were used as a base layer for the pile.
- Soils with PID readings greater than 70 ppm were placed on top of the base layer.

Soils entering the soil treatment area were segregated and tracked by PID readings and relative moisture. These observations then were applied to management decisions, such as where to focus mixing and treatment efforts in the most efficient manner.

5.2 Management of Construction Debris and Wet Soils

During the excavation, asphalt pavement, utility pipe, construction debris, and concrete debris were encountered and brought to the soil treatment pile. These materials were processed in the wet debris areas built to the specifications of the Work Plan.

A wet soil processing area, consisting of a standard-size steel drop box, was constructed according to the Work Plan in the week before excavation began. The design required modification when it was found that the height of the sides of the box exceeded the tailgate height of the dump truck. A new wet soil processing area was constructed using the same 8-mil LDPE liner used in the soil treatment pad. A 24-foot x 22-foot pad with 18-inch-tall sides was built and covered lightly with absorbent material (dry concrete). Two smaller 4-foot x 6-foot x 18-inch leak-proof steel boxes were placed inside the processing area; these boxes were low enough for the dump truck to access directly by raising the lift gate enough for liquid to drain into the boxes, but not enough to deposit soils. On August 2, 2016, free liquids were present in the excavated soils and they were processed in the redesigned wet soil treatment area. Free liquids in soils were not encountered again during the excavation project.

5.3 Soil Mixing and Addition of Activated Persulfate

Soils deposited in the soil treatment pile were mixed and spread with a backhoe. The bucket of the backhoe was turned upside down so that the tines faced downward and combed the soil. After spreading the soil to an even depth, the backhoe would rake the soil continuously to enhance volatilization. Additional mixing and turning efforts were directed at the more contaminated soil by field records kept of soil observations and PID readings.

During the soil mixing operations sodium persulfate, supplied by PeroxyChem of Philadelphia, Pennsylvania, was added to the soil treatment pile. Supplied in 50-pound sacks and spread with the backhoe, approximately 1,950 pounds were mixed into the soil treatment pile between August 2 and 8, 2016. The white color of the persulfate was used to indicate that the material was evenly distributed and well mixed into the soil treatment pile. The soil treatment pile was monitored for moisture content and mixed periodically with the backhoe throughout the month of August 2016 before soil samples were collected to confirm treatment effectiveness.

5.4 Soil Sample Collection

Soil samples were collected from the soil treatment pile on August 31, 2016. Three discreet samples were collected from each quadrant of the pile for a total of 12 analytical samples. The sample location and identification labels are shown in Figure 5.

Analytical samples were collected by pushing Terra Core™ samplers into freshly exposed portions of the soil treatment pile and placing the samples into laboratory-preserved vials for analysis by EPA Method 5035.

The target treatment concentrations for the project were RCRA hazardous waste disposal and treatment standards. The target treatment standards and the analytical results for the treated soils are presented in Table 4.

5.5 Volatilization of Organic Compounds from the Soil Treatment Pile

In compliance with notification requirements for emission modifications for ATI's Title V Air Permit (Permit No. 22-0547-TV-01), ATI estimated the mass of CVOCs that could volatilize during the soil treatment process. Analytical results from soil samples collected from three boreholes advanced in the Acid Sump Area during the August 2015 design study were used to determine the estimates.

As a part of the source area excavation project, 20 soil samples were collected from the walls and floor of the excavation (see Section 4.5). Detected concentrations for volatile organic compounds (VOCs) in the 20 samples were averaged and multiplied by the total mass of the soil treatment pile to estimate the total mass of volatilized organic compounds. Using a soil density of 3,375 pounds per cubic yard and a total soil treatment volume of 500 cubic yards, the total volatilized mass was estimated to be approximately 152 pounds. Approximately 117 pounds of this total are TCA. The calculations to estimate volatilized mass are presented in Table 5.

6. Excavation Groundwater Treatment

A GWTP was constructed the week before the excavation began to lower the groundwater table in the area of the excavation and to treat extracted groundwater during the project. Approximately 6,900 gallons of groundwater were treated during the project to below target treatment concentrations specified in the Work Plan. Figure 2 shows the location of the various components of the as-built GWTP.

6.1 Preliminary Tasks

Sumps

The preliminary installation of two groundwater extraction sumps (S1 and S2) was discussed in Section 4.1. Two 1½-horsepower (HP) submersible pumps with electric float switches were placed in the sumps and plumbed through the subsurface utility corridors at the Site to prevent damage from construction equipment. After assessing the chemical resistance of a variety of hose materials, 1-inch-diameter 200 psi polyethylene hose was selected to connect the sump pumps to the filter tank. In addition to the dedicated sump pumps, a variety of portable electric submersible sump pumps was used to dewater the excavation.

Filter Tank

A 20,000-gallon open-topped filter tank was positioned to the west of the project area to store and filter extracted groundwater. Two 150-micron mesh screens were installed to filter water as it flowed from inlet to outlet. The filters retarded water movement between the three chambers of the tank and provided an opportunity for suspended solids to settle to the bottom of the filter tank.

To address concerns that potentially high CVOC concentrations in the extracted groundwater would not meet target treatment concentrations after a single pass through the air stripper, a recirculation system was built in the filter tank. A sump pump suspended in the outlet chamber of the filter tank directed water back into the inlet chamber through a cascading sprinkler system. This recirculation system had the added benefit of re-filtering the water through the mesh screens and thus reducing the likelihood of clogging the trays of the downstream air stripper. At the outlet to the filter tank a ½-HP centrifugal pump was used to transfer water to the air stripper at approximately 10 to 15 gallons per minute (gpm).

Air Stripper

A skid-mounted Stat 30™ air stripper supplied by CarbonAir of Roseville, Minnesota, was used to treat incoming water from the filter tank. The stripper had a 30-gallon sump and 6 air trays, and operated at 10 to 15 gpm at 80 to 110 cubic feet per minute of supplied air. Dedicated influent and effluent sample ports were built into the air stripper plumbing to assess treatment efficiency, which was modeled by CarbonAir to be 98.61 percent efficient at removing CVOCs at concentrations up to 400,000 micrograms per liter (μg/L). The air stripper had a self-contained transfer pump that was used to move treated water to a treated water tank.

Treated Water Tank

The treated water tank stored water that had been treated by the air stripper. It allowed extracted groundwater to be run through the air stripper and tested analytically for compliance with target treatment concentrations (MCLs) before discharge into the facilities Central Wastewater Treatment System (CWTS). The 6,900-gallon poly tank, rented from BakerCorp of Portland, Oregon, was placed next to the air stripper to minimize plumbing connections. Its discharge to the CWTS was through gravity and controlled by a 4-inch ball valve. The arrangement of the components of the GWTP are presented in Figure 4.

6.2 Groundwater Treatment Considerations

The Work Plan describes the calculations used to conservatively design the GWTP (see Work Plan Sections 6.1 through 6.3). In summary, the system was designed to handle 15 gpm of extracted water with a total CVOC concentration of approximately 356,000 μg/L and discharge water at concentrations below MCLs. TCA, if encountered at high concentrations, was the only compound that might not meet MCL targets in a single pass through the air stripper, even at a removal efficiency of approximately 99 percent. For that reason, a recirculation system was installed in the filter tank.

The maximum influent rate observed during the project was approximately 5 gpm during the initial dewatering of the excavation area. Extraction rates during the excavation were generally lower because there often was little water at the bottom of the excavation or what water was present above the Spencer Formation was too turbid to pump efficiently. Averaging the analytical results of groundwater samples taken from the two sumps (S1 and S2), the actual total CVOC influent concentration to the GWTP was 42,030 μg/L; roughly a tenth of the design influent estimate. Table 6 presents a summary of designed influent concentrations, observed influent concentrations, and treated water concentrations for CVOCs.

6.3 GWTP Operations

The sump pumps began filling the filter tank on July 28, 2016. Flow meters were installed at the sumps and the filter tank influent valve, but these rapidly clogged and were removed. Water volumes were determined by using depth versus volume tables supplied by the tank vendors and comparing volumes to the meter on the air stripper, which was not affected by turbidity. Before the start of actual digging on August 1, 2016, the filter tank held approximately 5,500 gallons of water that were removed by the sump pumps. During the next 8 days, an additional 1,400 gallons of groundwater were extracted from the excavation area using a combination of the sump pumps and portable submersible pumps for a total extraction volume for the project of 6,900 gallons.

After approximately 6,500 gallons of water were in the filter tank, 6,100 gallons of that water were pumped through the air stripper and transferred into the treated water tank. Analytical samples collected after passing through the air stripper showed that no CVOCs were detected in the treated water with the exception of TCA, which was detected at 0.68 µg/L. The MCL, or target treatment concentration for TCA is 200 µg/L. Table 6 presents the CVOC concentrations reported for treated groundwater.

After treated water analysis confirmed the efficacy of the air stripper, the remaining filter tank water (800 gallons) was treated and placed into the treated water tank. On August 9, 2016, all treated water was released to a catch basin for discharge by the facility's CWTS.

6.4 Groundwater Sample Collection

Initial groundwater sampling of the two sumps was completed soon after installation using dedicated weighted bailers. Sampling of the influent and effluent of the air stripper was completed through dedicated sampling ports installed in the air stripper plumbing. Samples were collected in laboratory-preserved bottles and analyzed by EPA Method 8260B by ASL according to the analytical requirements in Table 6-3 of the Work Plan.

Table 7 presents the analytical results for excavation groundwater including the concentrations from each sump, S1 and S2, and the air stripper influent and effluent. The lower concentrations observed in the air stripper influent relative to sump concentrations are the result of treatment that took place in the filter tank. The air stripper purchased for the project had an additional service tray from the one modeled in the Work Plan and the removal of TCA, from 2,180 µg/L in the influent to 0.68 µg/L in the effluent, exceeded the modeled removal efficiency rate of 98.61 percent (removal efficiencies are compound specific; this efficiency rate is for the removal of TCA with a Stat 30 air stripper with six service trays).

6.5 Estimated Mass of CVOCs Removed during Groundwater Treatment

The Work Plan estimated the mass of CVOCs to be removed during groundwater treatment at 980 pounds (see Work Plan, Section 6.6 for mass calculations). In summary, the calculations used the conservative influent concentration derived from historical source area well data and a total extraction volume of 330,000 gallons. Actual CVOC mass volatilization for the project was calculated to be approximately 2.5 to 3.7 pounds based on actual CVOC concentrations from the extraction sumps (S1 and S2) and the total extraction volume of 6,900 gallons. The 2.5-pound estimate was derived from averaging the CVOC concentrations from the two sumps while the high estimate (3.7 pounds) was derived from using the higher concentrations from sump S2 alone. Table 7 presents the details used to estimate the mass of volatilized CVOCs for the GWTP.

7. Reporting

The Work Plan summarized the three documents that were to be submitted to EPA as part of the source area soil excavation project:

- **Remedial Design Work Plan**. Submitted to EPA on April 27, 2015, and revised after comments from EPA to ATI in a letter dated June 19, 2015, and discussions in Seattle, Washington, with EPA on July 7, 2015. The revised plan was submitted to EPA on July 10, 2015.
- **Remedial Action Plan**. The Work Plan that was used to complete the excavation project. Revised final plan was submitted to EPA on July 5, 2016, and approved by EPA on July 11, 2016.
- **Remedial Action Report**. This document, which is the construction report summarizing the excavation project work completed in August 2016.

Evaluation of the impact the remedial action had on groundwater in the source area will be presented in future annual Fabrication Area Groundwater Remedial Action Progress Reports.

8. Discussion and Performance Monitoring

The design plan selected excavation and chemical oxidant treatment as the preferred remedial action for reducing source CVOC mass in the Acid Sump Area (see Section 4).

The footprint of the excavation was somewhat larger than planned because the modified excavation strategy exposed less of the excavation wall than previous designs and the foundation engineer at the Site approved extending the excavation somewhat; particularly in the southeast corner. Nevertheless extending the excavation beyond the limitations imposed from the existing facility operations and infrastructure was never a viable option, as explained in Section 4.1 of the Work Plan.

During the excavation project approximately 500 cubic yards of soil were treated to below the target treatment standards for disposal in a Subtitle D landfill (see Table 4). Approximately 152 pounds of organic compounds, including 117 pounds of TCA, were removed from the soil during treatment (see Section 5.4 and Table 5). Figure 5 presents the TCA results spatially in the soil treatment pile. The soil is currently on the RCRA treatment pad at the facility (SLEP), covered, and awaiting transport to the landfill during the dry season.

Approximately 6,900 gallons of groundwater were treated with a portable air stripper during the excavation project to below target treatment concentrations (MCLs) specified in the Work Plan. Concentrations of CVOCs in untreated and treated groundwater, and target treatment concentrations, are presented in Table 6.

Table 2 presents the soil sampling results for soil samples collected on the walls and the floor of the excavation. The TCA results also are presented spatially in Figure 4. While the contaminant mass removed from the treatment of excavation soils and groundwater can be closely estimated it is not practical to estimate the contaminant mass left behind given the physical and operational constraints that limit understanding of contaminant characteristics in this area of the Site. It is reasonable to expect that the removal of contaminated soils and groundwater in the vicinity of the attempted installation of extraction well FW-8 will reduce the time required to achieve the groundwater cleanup goals established in the Record of Decision (ROD) for CVOCs; that was the stated goal of the Work Plan (see Section 1).

The primary tool for evaluating the effectiveness of the source area soil excavation project will be to evaluate the concentration trends observed in Acid Sump Area groundwater monitoring wells. The source area excavation project required removing temporary monitoring wells TMW-1, TMW-4, and I-1. In discussions with EPA, ATI agreed to include adjacent monitoring wells EI-5, I-2, and I-3 in the semiannual Acid Sump Area groundwater monitoring program. Construction logs for the added wells were included as Appendix A of the Work Plan. ATI included the three wells in the fall 2016 sampling event. The performance impacts of the remediation project will be documented in future annual Fabrication Area Groundwater Remedial Action Progress Reports.

9. References

GSI. 2016. Acid Sump Source Area Remedial Action Plan – Final, ATI Millersburg Operations, Oregon. July 5, 2016. Prepared by GSI Water Solutions, Inc. (GSI).

GSI. 2015. Acid Sump Source Area Remedial Design Work Plan, ATI Millersburg Operations, Oregon. July 10, 2105. Prepared by GSI Water Solutions, Inc. (GSI).

DEQ. 2015. State of Oregon Department of Environmental Quality Risk-Based Concentrations. Revision: November 1, 2015.

Table 2. Excavation Soil Sampling Results
ATI Millersburg Operations, Oregon

Sample ID[2]	Date Sampled	Distance West[1] (feet)	Distance South[1] (feet)	Depth (feet)	Quadrant	Chlorinated Volatile Organic Compounds (CVOCs) Method 8260B / SW 5030						
						TCA (µg/kg)	1,1-DCA (µg/kg)	PCE (µg/kg)	TCE (µg/kg)	cis-1,2-DCE (µg/kg)	1,1-DCE (µg/kg)	VC (µg/kg)
AS-1500-06-0816	8/3/16	15	0	6	NE	294,000	16,700	2,880	836	173	2,920	173
AS-1500-12-0816	8/3/16	15	0	12	NE	18,500	1,490	115 U	115 U	115 U	990	115 U
AS-1508-06-0816	8/5/16	15	8	6	NE	5,300	216	69	66.5 U	66.5 U	225	66.5 U
AS-1508-12-0816	8/5/16	15	8	12	NE	1,920	730	73.2 U	73.2 U	73.2 U	1,330	73.2 U
AS-1520-06-0816	8/3/16	15	20	6	SE	7,450	3,160	226	142 U	142 U	151	142 U
AS-1520-12-0816	8/5/16	15	20	12	SE	1,220	460	66.2 U	66.2 U	66.2 U	320	66.2 U
AS-1530-06-0816	8/3/16	15	30	6	SE	56,000	9,340	1,130	431	138 U	2,360	138 U
AS-1530-12-0816	8/3/16	15	30	12	SE	90,400	527	480	144	106 U	13,000	106 U
AS-2205-14.5-0816	8/8/16	22	5	14.5	C	15,900	144	159	67.9 U	67.9 U	488	67.9 U
AS-2220-14.5-0816	8/8/16	22	20	14.5	C	149,000	195	402	479	57.8 U	6,790	57.8 U
AS-3025-06-0816	8/4/16	30	25	6	SW	476 U	476 U	476 U	476 U	476 U	476 U	476 U
AS-3025-13-0816	8/4/16	30	25	13	SW	8,850	787	245 U	245 U	245 U	4,670	245 U
AS-3500-11.5-0816	8/1/16	35	0	11.5	NW	44,200	152	116	347	106 U	8,430	106 U
AS-3500-14.5-0816	8/1/16	35	0	14.5	NW	155,000	568	107 U	656	107 U	6,280	107 U
AS-3505-14.5-0816	8/9/16	35	5	14.5	C	50.3 U	50.3 U	50.3 U	581	50.3 U	50.3 U	50.3 U
AS-3520-16-0816	8/9/16	35	20	16	C	2,930	156	55 U	55 U	55 U	165	55 U
AS-4005-06-0816	8/4/16	40	5	6	NW	159	132 U	132 U	132 U	132 U	132 U	132 U
AS-4005-10-0816	8/4/16	40	5	10	NW	3,820	400	128 U	128 U	128 U	1,860	128 U
AS-4015-06-0816	8/4/16	40	15	6	SW	142 U	142 U	142 U	142 U	142 U	142 U	142 U
AS-4015-12-0816	8/4/16	40	15	12	SW	8,490	1,080	482 U	482 U	482 U	5,630	482 U
RBC Excavation Worker [3]						1,500,000	890,000,000	50,000,000	13,000,000	710,000	370,000,000	950,000

Notes:

[1] Distance is keyed to a benchmark located approximately 15 feet east of the excavation

[2] Sample AS-1530-06-0816 is: AS(Acid Sump)-1530(15 feet east of benchmark and 30 feet south of excavation north wall)-06(6 feet deep)-0816(collection date)

[3] RBC = Risk-Based Concentration. Source: Oregon Department of Environmental Quality table, "Risk-Based Concentrations for Individual Chemicals," revision dated November 1, 2015. (shown for comparative purposes only)

TCA = 1,1,1-trichloroethane
DCA = 1,1-dichloroethane
PCE = tetrachloroethene
TCE = trichloroethene
cis-DCE = cis-1,2-dichloroethene
DCE = 1,1-dichloroethene
VC= vinyl chloride
U = Compound not detected and reported as less than the reporting limit

Table 3: Analytical Results for CVOC Passive Monitoring Badges
ATI Millersburg Operations, Oregon

Date	Name[1]	Duty	Badge Number[2]	Exposure Time[3] (min)	Vinyl Chloride (ppm)	1,1,1 - TCA (ppm)
8/2/16	---	Excavator – Barker Trucking	LW1612	480	< 0.05	1.1
8/2/16	---	Excavation Oversight - GSI	LW1364	480	< 0.05	1.1
8/2/16	---	Soil Treatment Oversight - GSI	LW1505	480	< 0.05	<0.3
8/3/16	---	Excavation Oversight - GSI	LW1358	480	< 0.05	1.4
8/3/16	---	Excavator – Barker Trucking	LW1822	480	< 0.05	0.5
8/3/16	---	Spotter – Barker Trucking	LW5401	480	< 0.05	1.8
8/4/16	---	Soil Treatment Oversight - GSI	LW1702	390	< 0.06	<0.3
8/4/16	---	Excavation Oversight - GSI	LW1570	390	< 0.06	<0.3
8/4/16	---	Excavator - GSI	LW1470	390	< 0.06	<0.3
8/8/16	---	Excavator – Barker Trucking	LW4113	420	< 0.06	NA
				Occupational Exposure Limits	*OSHA TWA* 1 ppm	*OSHA TWA* 350 ppm

Notes:

[1] Privacy in compliance with the Health Insurance Portability and Accountability Act of 1996 (HIPPA)
[2] Monitoring badges have unique numbers that are associated with the worker wearing the badge
[3] Exposure time starts when the seal is broken on the badge and ends when the badge is capped

1,1,1-TCA = 1,1,1-trichloroethane
min = minute
ppm = parts per million
< = compound not detected above the reporting limit
OSHA = Occupational Health and Safety Administration
TWA = Time Weighted Average

Table 4. CVOC Concentrations in Treated Soils - August 31, 2016
ATI Millersburg Operations, Oregon

Sample ID[1]	TCA (µg/kg)[2]	DCA (µg/kg)	TCE (µg/kg)	DCE (µg/kg)	cis-DCE (µg/kg)	VC (µg/kg)
RCRA LDR	6000	6000	6000	6000	NA	6000
NE_01	134 U	134 U	134 U	134 U	134 U	134 U
NE_02	144 U	144 U	144 U	144 U	144 U	144 U
NE_03	118 U	118 U	118 U	118 U	118 U	118 U
NW_01	133 U	133 U	133 U	133 U	133 U	133 U
NW_02	135 U	135 U	135 U	135 U	135 U	135 U
NW_03	123 U	123 U	123 U	123 U	123 U	123 U
NW_03 Dup	99.2 U	99.2 U	99.2 U	99.2 U	99.2 U	99.2 U
SE_01	38.4 J	118 U	118 U	118 U	118 U	118 U
SE_02	103 U	103 U	103 U	103 U	103 U	103 U
SE_03	32.2 J	98.3 U	98.3 U	98.3 U	98.3 U	98.3 U
SW_01	108 J	126 U	126 U	126 U	126 U	126 U
SW_02	78.2 J	162 U	162 U	162 U	162 U	162 U
SW_03	158	107 U	107 U	107 U	107 U	107 U

Notes:

1 Sample locations are presented in Figure 5. Samples were collected from northeast (NE),northwest (NW), southeast (SE), and southwest (SW) quadrants of the soil treatment pile on August 31, 2016

2 Sample concentrations are presented in micrograms per kilogram (µg/kg)

3 Target treatment concentrations are RCRA hazardous waste disposal and treatment standards

4 Land disposal requirements from RCRA §268.48

U = compound not detected and reported as less than the reporting limit
J = estimated concentration below the reporting limit
TCA = 1,1,1-trichloroethane
DCA = 1,1-dichloroethane
TCE = 1,1,1-trichloroethene
DCE = 1,1-dichloroethene
cis-DCE = cis-1,2-dichloroethene
VC = vinyl chloride

Table 5. Estimated Mass of Volatilized CVOCs in Excavation Soils
ATI Millersburg Operations, Oregon

Analyte[1]	Average Concentration[2] (ug/kg)	Mass Volatilized[3] (lbs)
1,1,1,2-Tetrachloroethane	75	0.13
1,1,1-Trichloroethane	69552	117.37
1,1-Dichloroethane	3539	5.97
1,1-Dichloroethene	4494	7.58
1,2,4-Trimethylbenzene	1450	2.45
1,3,5-Trimethylbenzene	1720	2.90
Chloroethane	1340	2.26
Ethylbenzene	188	0.32
Isopropylbenzene	207	0.35
m,p-Xylene	598	1.01
Naphthalene	971	1.64
n-Butylbenzene	1910	3.22
n-Propylbenzene	917	1.55
o-Xylene	204	0.34
p-Isopropyltoluene	1410	2.38
sec-Butylbenzene	1620	2.73
Total Mass Volatilized[4]		152.20

Notes:

[1] All detected concentrations of CVOCs are included in the total mass calculation

[2] Average concentrations are derived from sum of excavation wall and floor soil samples

[3] Derived from the mass of soil from 500 cubic yards of excavated soils at an assumed soil density of 3,375 pounds per cubic yard; a typical value for wet gravels

[4] Sum of the average CVOC concentrations multiplied by the mass of excavated soil. Conservatively assumes 100% volatilization of all CVOC compounds

Table 6. Designed and Observed CVOC Concentrations in Untreated and Treated Groundwater
ATI Millersburg Operations, Oregon

Chemical of Concern	Design Influent Concentration[1] (µg/L)	Observed Influent Concentration[2] (µg/L)	Target Treatment Concentration[3] (µg/L)	Observed Treatment Concentration (µg/L)
1,1,1-TCA	280,000	32,350	200	0.68
1,1-DCA	36,000	4,560	50	0.5 U
1,2-DCA	1,000	31 U	5	0.5 U
Chloroethane	13,000	2,375	25	0.5 U
Trichloroethene (TCE)	2,000	91	5	0.5 U
cis-1,2-DCE	1,000	31 U	70	0.5 U
trans-1,2-DCE	1,000	31 U	100	0.5 U
1,1-DCE	20,000	2,442	7	0.5 U
Vinyl Chloride	1,000	75	2	0.5 U
Tetrachloroethylene (PCE)	1,000	41	5	0.5 U

Notes:

[1] Design influent concentrations provided in Remedial Action Work Plan

[2] Observed influent concentrations are the average of the two sump samples, S1 and S2

[3] Target treatment goals were based on EPA MCLs if available

µg/L = micrograms per liter

U = not detected and reported as less than the reporting limit

TCA = trichloroethane

DCA = dichloroethane

DCE = dichloroethene

Table 7. Analytical Results for Excavation Groundwater

ATI Millersburg Operations, Oregon

Chemical of Concern	Sump S1[1] (µg/L)	Sump S2 (µg/L)	Air Stripper Influent[2] (µg/L)	Air Stripper Effluent[3] (µg/L)
Analytical Method	EPA Method 8260B			
Sample ID	ASA-S1-072816	ASA-S2-072816	ASA-ISP-080316	ASA-ESP-080316
Sample Date	7-28-16	7-28-16	8-03-16	8-03-16
1,1,1-TCA	13,800	50,900	2,180	0.68
1,1-DCA	5,030	4,090	79	0.5 U
1,2-DCA	25 U	100 U	1.5 U	0.5 U
Chloroethane	2,150	2,600	16	0.5 U
Trichloroethene (TCE)	67.9	115	5.89	0.5 U
cis-1,2-DCE	25 U	100 U	5 U	0.5 U
trans-1,2-DCE	25 U	100 U	5 U	0.5 U
1,1-DCE	813	4,070	100	0.5 U
Vinyl Chloride	44	105	5 U	0.5 U
Tetrachloroethylene (PCE)	31	100 U	5 U	0.5 U

Notes:

[1] Sump samples were collected at the sumps before groundwater extraction

[2] Influent samples are collected downstream of the filter tank and its recirculation system

[3] Efluent samples are collected on the downstream discharge port of the air stripper

µg/L = micrograms per liter

U = compound not detected and reported as less than the reporting limit

TCA = trichloroethane

DCA = dichloroethane

DCE = dichloroethene

Table 8. Estimated Mass of Volatilized CVOCs in Excavation Groundwater
ATI Millersburg Operations, Oregon

Total Volume Treated (gallons)	Total Volume Treated (liters)	CVOC Concentration in Extracted Groundwater[1] (µg/L)		Total Volatilized CVOC Mass (µg)	Total Volatilized CVOC Mass (lbs)	Days of Treatment[2] (days)	Average Daily Volatilized CVOC Mass (lbs/day)
6,900	26119	65,000	high estimate	1,697,756,385	3.74	10	0.374
6,900	26119	44,000	average	1,149,250,476	2.53	10	0.253

Notes:

[1] high estimate is derived from summing the highest CVOC concentrations from sump S2 alone (see Figure 7)
average estimate is derived by summing the mean CVOC concentration from the two sumps (S1 and S2)

[2] Days of treatment includes all days the filter tank recirculation system and air stripper were in operation

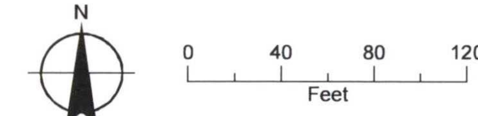
FIGURE 1

Acid Sump Area Location

Acid Sump Source Area Excavation
ATI Millersburg Operations, Oregon

LEGEND

- Monitoring Well
- Extraction Well
- Outfall
- Manhole
- Flakeboard Stormwater Line
- Excavation Area
- Roads
- Railroad



Date: January 18, 2017
Data Sources: Wah Chang, Aerial photo taken in March of 2010 by the City of Albany

GSI Water Solutions, Inc.

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FIGURE 2

Excavation Area Layout

Acid Sump Source Area Excavation
ATI Millersburg Operations, Oregon

LEGEND

- Existing Monitoring Well[1]
- Excavation Extraction Sump
- Attempted Extraction Well FW-8
- Utility Pole
- Temporary Beams
- Work Zone Exclusion Barriers
- Utility Corridor
- Active Acid Sump Conveyance Corridor
- Overhead Acid Line
- Flakeboard Stormline (7-19-16 Video)
- Approximate Excavation Area
- Groundwater Treatment Area

NOTE:
[1] I-2, I-3, and EI-5 were added to the groundwater monitoring program to replace I-1, TMW-1, and TMW-4 which were abandoned by excavation.

N

0 8 16 24
Feet

Date: January 18, 2017
Data Sources: Wah Chang, Aerial photo taken in March of 2010 by the City of Albany

GSI Water Solutions, Inc.

Document Path: P:\Portland\168 - Wah Chang\025-Acid Sump Remediation\Project_GIS\Project_mxds\Figure2_Excavation_Area_Layout.mxd

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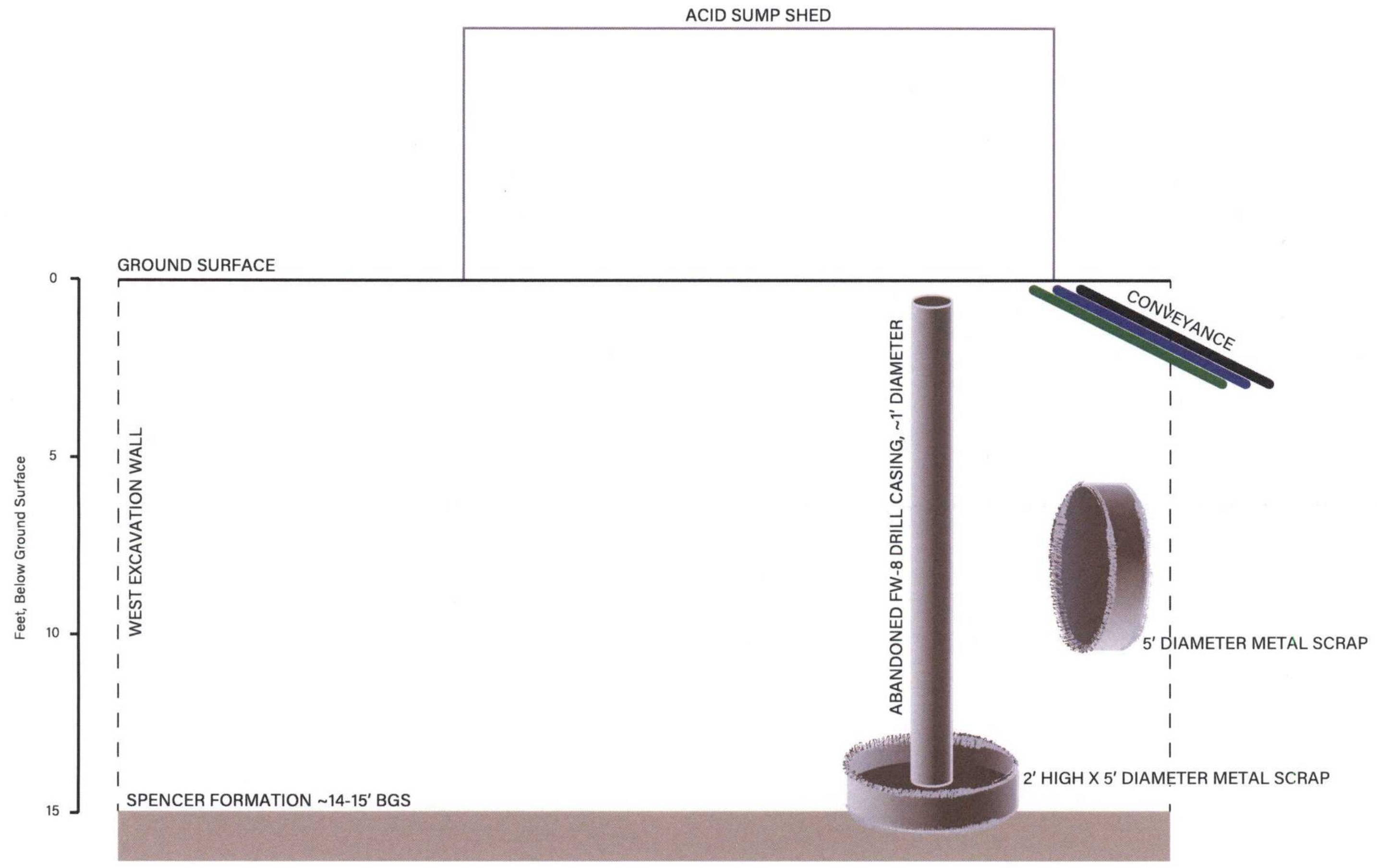
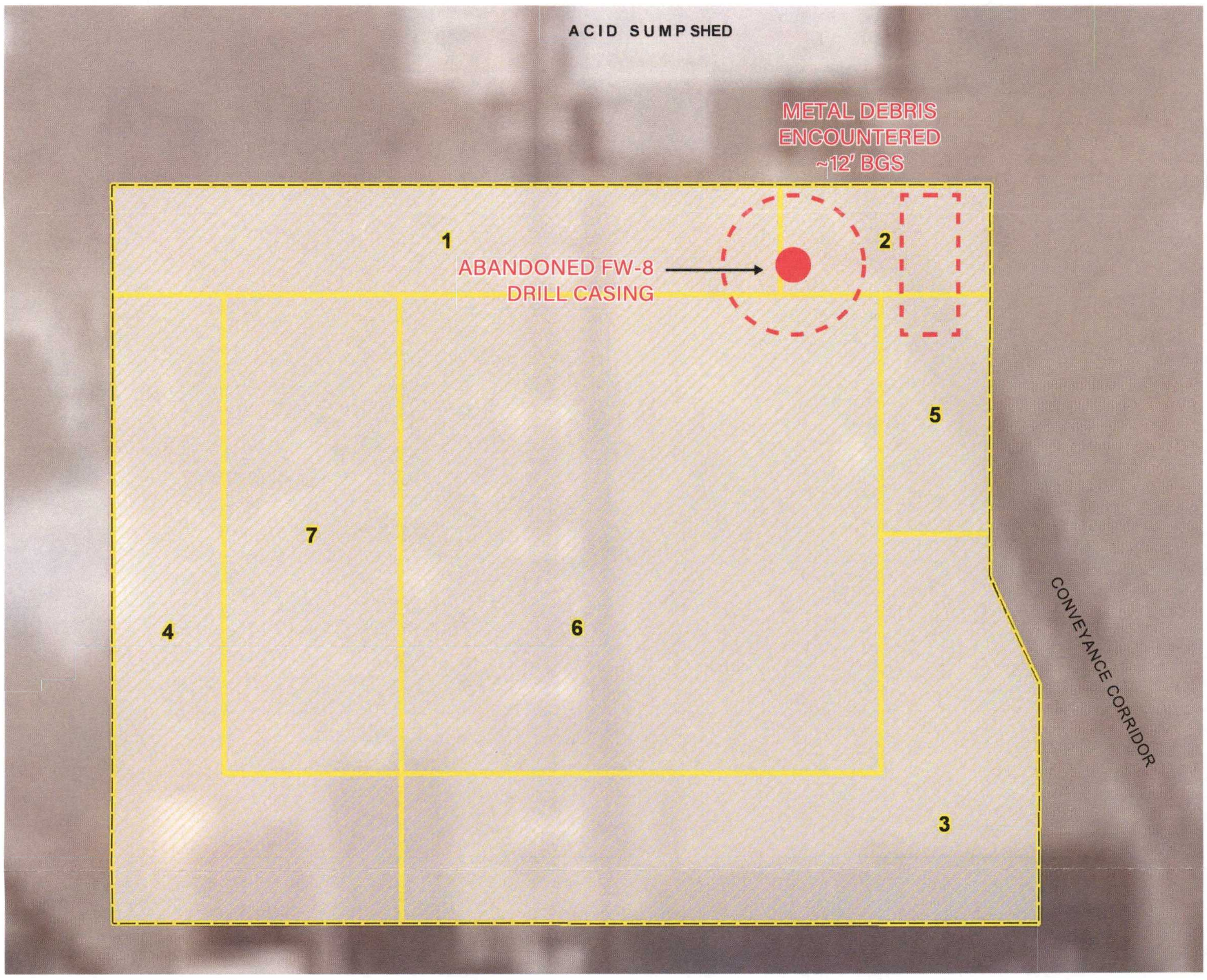


PLAN VIEW



LEGEND

Excavation Sequence

Approximate Excavation Area

N

0 4 8

Feet

FIGURE 3

FW-8 Obstruction Excavation Sequence

Acid Sump Source Area Excavation

ATI Millersburg Operations, Oregon

GSI Water Solutions, Inc.

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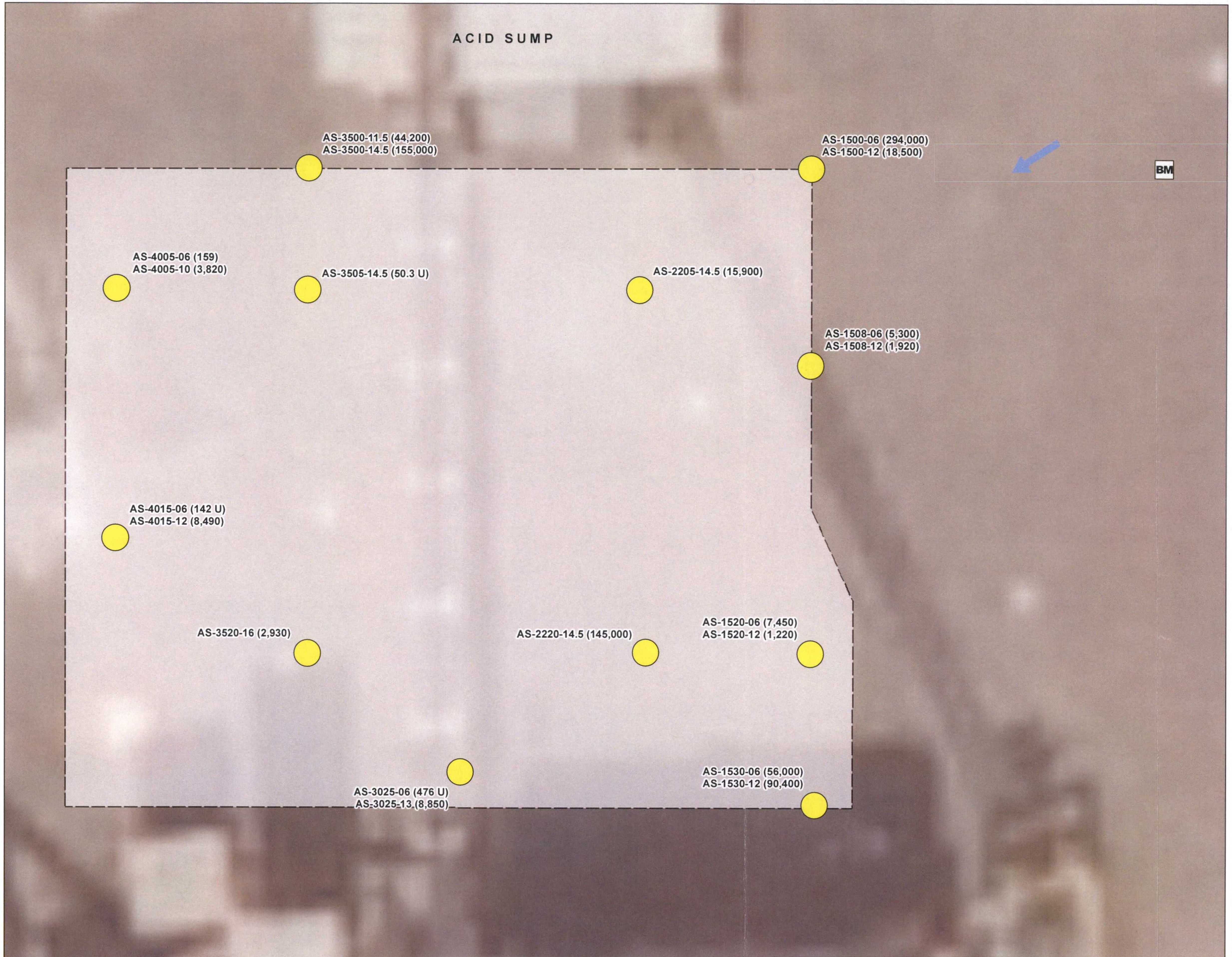

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FIGURE 4

Soil Sample Locations and TCA Results

Acid Sump Source Area Excavation
ATI Millersburg Operations, Oregon

LEGEND

Soil Sample Location

BM Bench Mark

Approximate Direction of Groundwater Flow

Approximate Excavation Area

NOTES:
TCA: 1,1,1-Trichloroethane
U: Compound not detected

Sample identification is keyed to the distance in feet to a bench mark (BM).
Thus sample point **AS-2205-14.5** is:
AS: Acid Sump
22: 22 feet west of BM (benchmark)
05: 5 feet south of north edge of the excavation
14.5: 14.5 feet below pre excavation ground level

Soil samples were collected from excavator bucket at measured depth from original ground surface.

Concentrations of TCA in the sidewalls and floor of the excavation area are presented in micrograms per kilogram (µg/kg) in parenthesis at each sample location.

N

0 2 4 6
Feet

Date: May 9, 2017
Data Sources: Wah Chang, Aerial photo taken in March of 2010 by the City of Albany

GSI Water Solutions, Inc.

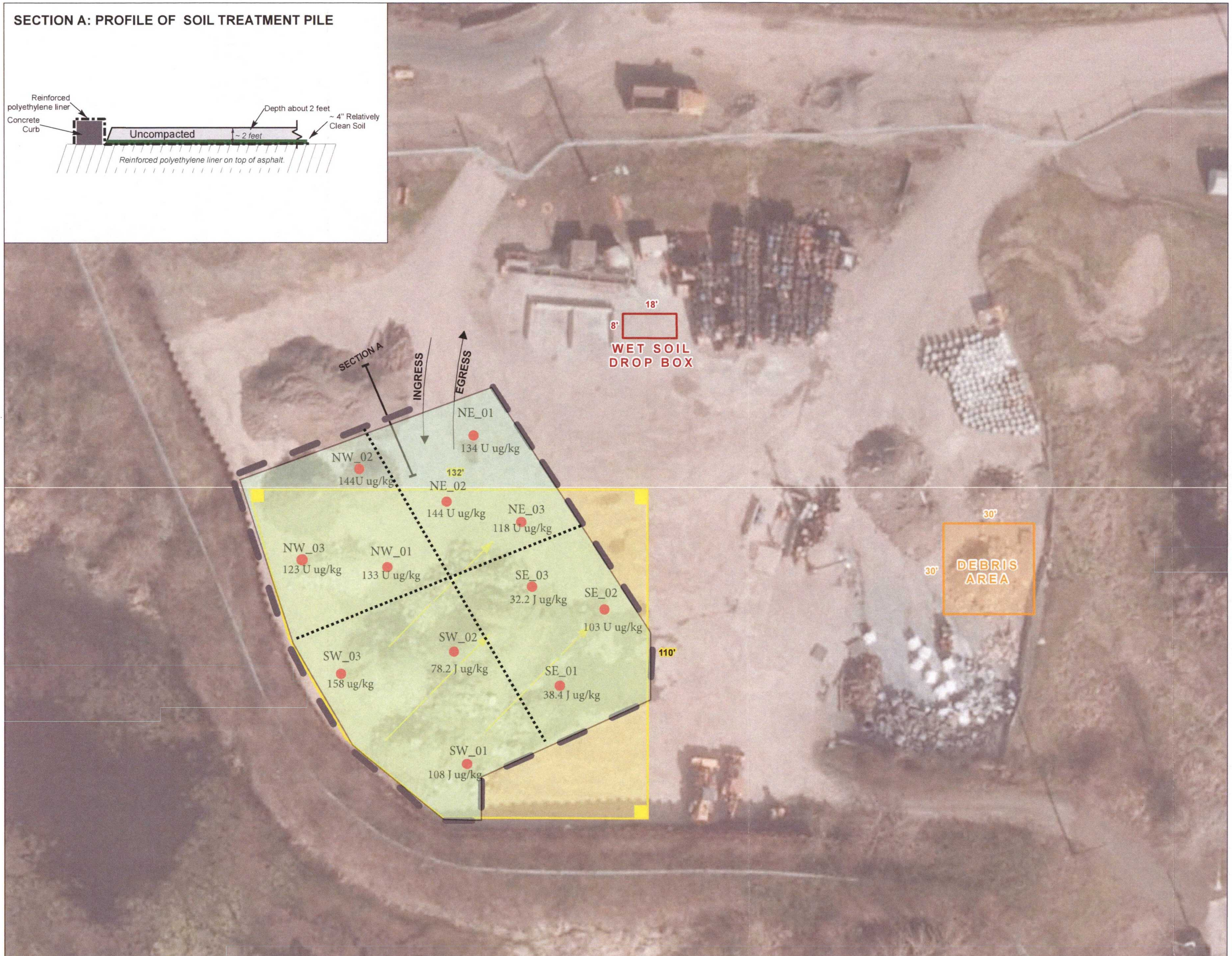

FIGURE 5

As-Built Soil Treatment Pile & Confirmation Sample Locations

Acid Sump Source Area Excavation

ATI Millersburg Operations, Oregon

LEGEND

- Discrete Sample Location
- Cross Section
- Concrete Curb
- Wet Soil Drop Box
- Proposed Soil Treatment Pile, ~12,000 sq. ft.
- Debris Contingency Area, ~900 sq. ft.
- As Built Soil Treamtment Pile

NOTE:

Soil treatment and mixing continued until analytical results from EPA Method 5035 confirmed that concentrations of chlorinated volatile organic compounds had fallen below target treatment concentrations and RCRA toxicity standards for disposing of treated soils in Subtitle D landfill.

Concentrations of TCA in treated soils are presented in micrograms per kilogram (µg/kg) below the sample location.

Concentrations preceded by a U indicate the analyte was not detected. Values preceded by a J indicate that the concentration is estimated.

Approximately 500 cubic yards of soil were treated from August 3 through August 31, 2016.

N

0 16 32 48

Feet

MAP NOTES:

Date: May 5, 2017

Data Sources: Wah Chang, Aerial photo taken in March of 2010 by the City of Albany

GSI Water Solutions, Inc.

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Attachment A

Preliminary Structural Engineering

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Attachment B

Construction Photographs

Acid Sump Area Source Area Removal Construction Photographs

Photo 1. Pre-excavation layout with area roughly delineated by orange cones. Sub-surface conveyance corridor in the foreground leads to the acid sump, which is covered by the blue shed to the right. The overhead acid utility runs along the top of the photo. Approximate location of former FW-8 indicated by blue and red marker (West Camera Direction).

Photo 2. Initiation of the excavation with surface asphalt and concrete removed. Sumps are in place and dewatering the excavation. S2 is shown just below the center tire of the dump truck (West).

Photo 3. Excavator removing pickling basket, or metal debris from below 2007 attempted well FW-8. Metal pipe lying on the ground in front of the excavator bucket is the abandoned FW-8 sonic drill casing (Southeast – Segments 1 and 2).

Photo 4. Digging along east wall in Segment 5 (see Figure 3) after concrete perimeter fills in Segments 2 and 3. Yellow in-line blower exhausts air from excavation. Soil samples collected from this excavation wall at 6-feet and 12-feet below ground surface (North)

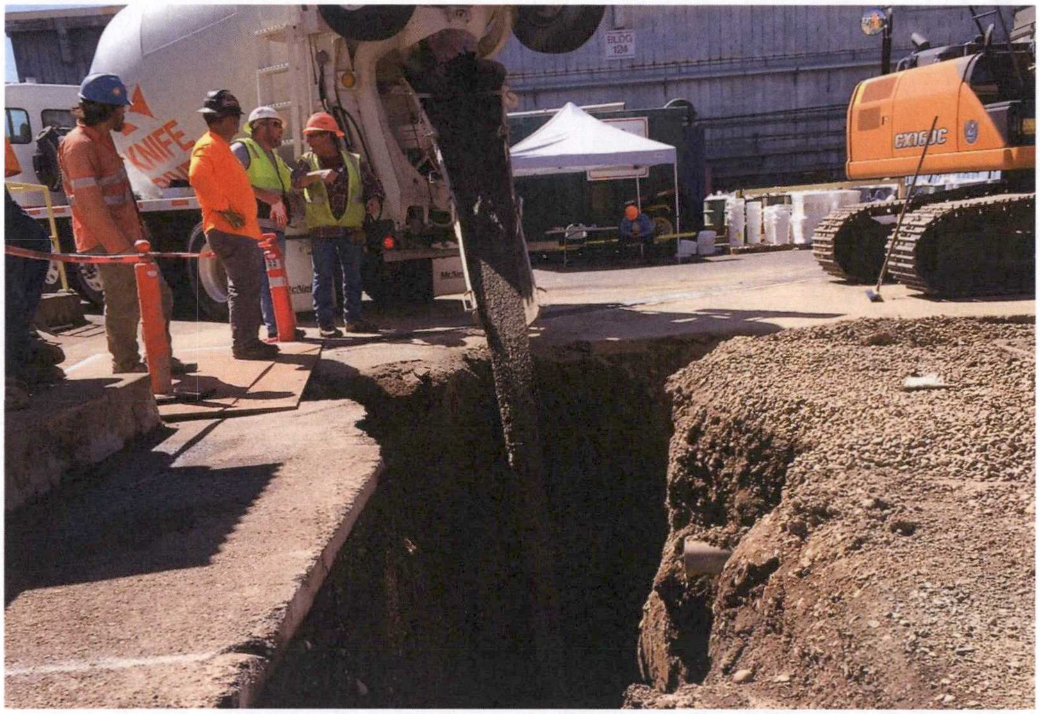

Photo 5. Perimeter sections were filled with 2-inch minus drain rock, chemical oxidant at a rate of 2.5 pounds per square foot, and a 6-inch deep cover layer of ¾-inch minus filter rock. Knife River, shown here in the SW corner of Segment 4, completed the fill with controlled low-strength material (CLSM), or lean concrete (West).

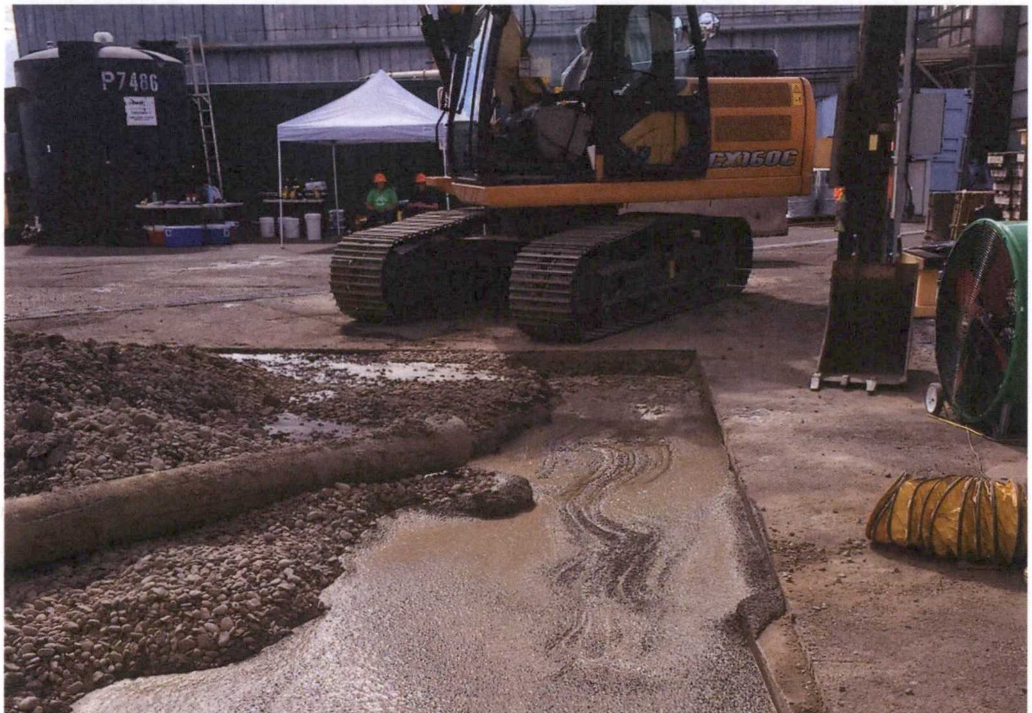

Photo 6. Completion of the CLSM fill along the north wall of the excavation in Segment 1. 'Pipe' on the ground in front of the excavator is the abandoned drill casing from attempted well FW-8 in 2007. Tank in upper left (P7486) is the 6900 gallon treated-water tank (West).

Photo 7. Central Segments (6&7) were excavated to depth, shown here, after CLSM in perimeter sections had cured. Fill consisted of round 2-inch minus drain rock, chemical oxidant applied at a rate of 2.5 pounds per square foot, and angular ¾-inch minus filter rock (Southeast).

Photo 8. In central Segments 6 and 7 the ¾-inch minus filter rock was added in 1-foot lifts and hoe-compacted to ground surface (Southwest).

Photo 9. Construction of the soil treatment pile with pre-fabricated 8-mil low-density polyethylene scrim liner 144-foot wide by 160-foot long. Edges of liner were draped over concrete jersey barriers to contain any potential runoff from leaving the pad (Southwest).

Photo 10. Base layer of the treatment pile was constructed using PID-screened soils. Excavator bucket with tines was used to evenly distribute and mix soils in the treatment pile (Northwest).

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ATI Acid Sump Area
Source Area Soil Excavation
Construction Report
Albany, Oregon

May 5, 2017

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